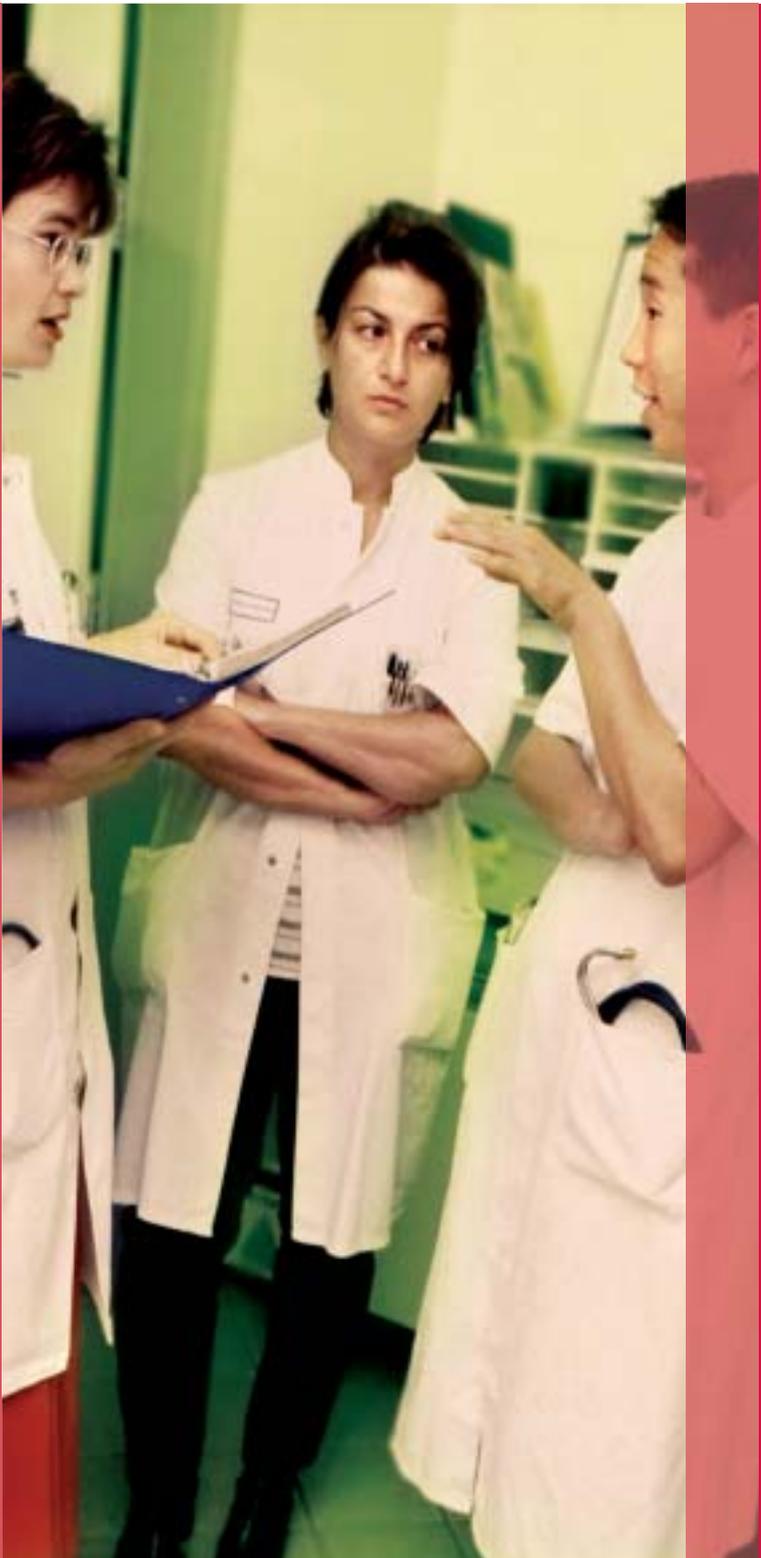**NFU**
NEDERLANDSE FEDERATIE VAN
UNIVERSITAIR MEDISCHE CENTRA

# The 2009 Framework for Undergraduate Medical Education in the Netherlands

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**Editorial board**

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# Preface

Various developments over the last few years have called for the 2001 Medical Education Blueprint[1] to be revised. On the one hand, medical education in the Netherlands changed in the wake of the introduction of the Bachelor's-Master's degree structure in its first-stage degree programmes and educational innovations in its second-stage advanced medical education. On the other hand, there were medico-scientific changes, such as discoveries in the domain of genetics, and social changes, such as society's call for greater awareness of quality of care and patient safety.

Having consulted many parties involved, the Board of the Dutch Federation of University Medical Centres decided to commission a Project Group, composed of representatives from all Dutch University Medical Centres, to revise the 2001 Medical Education Blueprint, taking on board all of the above changes and taking care of the Framework's appropriate embedding in the national, European, and wider international context.

The present 2009 Framework defines the learning outcomes of university Master's degree programmes in Medicine in terms of competencies in those roles that must be mastered by physicians in order for them to function in a range of professional settings. These learning outcomes have been phrased in general terms and should be regarded as a set of minimum requirements that warrant to society at large and to patients in particular at what level medical graduates can be expected to function as beginning practitioners.

The definitions have not been greatly detailed so as to offer scope to the University Medical Centres themselves to establish more comprehensive and in-depth interpretations of particular topics and allow them to build more distinctive profiles for themselves. Nor does the Framework provide any guidance on how these learning outcomes are to be translated into educational curricula, as this comes within the compass of responsibility of the individual

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[1] Metz JCM et.al. (Ed.). *Blueprint 2001: training of doctors in the Netherlands, adjusted objectives of undergraduate medical education in the Netherlands,* 2001, Mediagroep, Nijmegen.

University Medical Centres themselves. This Framework can be useful in serving quality control and accreditation purposes in medical education and, in this way, hopes to sustain the pursuit of quality improvement and to live up to expectations society may have of its medical professionals.

Utrecht, the Netherlands, October 2009

Professor L.J. Gunning-Schepers
Chairperson of the Dutch Federation
of University Medical Centres

Professor C.L.A. van Herwaarden
Chairperson of the Project Group

# Contents

## 1.1 General

This 2009 Framework reflects the wish of the medical faculties in the Netherlands – already expressed in the 1994 Blueprint – for the Framework to be subject to continuous critical monitoring and, at regular intervals, for it to be upgraded to fit developments in the medical world and in society at large.

This 2009 Framework outlines the joint national learning outcomes of the Master's degree programme in medical education with a view to warranting to society and, more particularly, to patients that graduates in medicine, first starting out as practitioners, have attained certain professional levels. The various attainment levels in medical education, including that of graduates in medicine, are described in the 2009 Framework (Chapter 4). The attainment levels of graduates in medicine can also be derived from the combined physicians' target profile (Chapter 5), physicians' competencies after completing their Master's degree programme in Medicine (Chapter 6), and the list of issues relating to illness and health (Chapter 7) with its accompanying explanation. The starter level, the Bachelor's degree programme, is specifically discussed in Chapter 8.

The learning outcomes laid down in this Framework must be translated into a curriculum, which falls within the responsibility of the individual medical faculties. The learning outcomes must also be translated into learning objectives by each educational unit. This allows the medical faculties leeway to highlight topics in their own curricula. With regard to learning outcomes relating to basic subjects in natural sciences, the behavioural and social sciences, this Framework has included general recommendations (Chapter 9).

In this Framework, the learning outcomes of medical education have been formulated in terms of competencies. A competency can be regarded as the ability to adequately perform a professional activity in a specific authentic context by virtue of the integrated acquisition of knowledge, skills, and professional behaviour. This definition affects the way in which medical education curricula design their testing programmes. Particularly upon completion of the Master's degree programme, the testing methodology needs to be suited to assessing the competencies outlined here. The medical

faculties cannot confine themselves to isolated assessments of knowledge and skills, and choices to be made in this respect fall within the medical faculties' responsibility.

## 1.2 Commission

In February 2007, the board and the Assembly of Deans of Medical Schools of the Dutch Federation of University Medical Centres decided to institute a Project Group to Revise the 2001 Medical Education Blueprint. They were guided by the following considerations:

1 Developments in medical education made it imperative to undertake a revision of the 2001 Blueprint. The developments referred to were the introduction of the Bachelor's-Master's degree structure in medical education and the modernization of advanced medical education.

2 Developments in the medical discipline itself also called for revision of the 2001 Blueprint, aiming to include these new developments in the medical curricula. In the case of Medical Biotechnology and Genetics, the Assembly of Deans of Medical Schools had already advised the Ministry of Health, Welfare and Sport on this matter.

3 In revising the 2001 Blueprint:

   a the attainment levels of both the Bachelor's programme in Medicine the Master's programme in Medicine and needed to be established;

   b it needed to be considered whether the CanMEDS[2] model or a similar competency profile, which are currently being tested in the framework of the modernization of advanced medical education, could also be serviceable in revising the new Framework for Medical Education;

   c the document needed to be brought in line with the Dublin descriptors for Bachelor's and Master's degree programmes in university education.

4 The level of detail of the revised 2001 Blueprint needed to be reconsidered, aiming to find formulations that were realistic and testable and that allowed external accountability of medical education programme content.

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[2]  Jason R. Frank, MD MA [Ed] FRCPC: *The CanMEDS 2005 Physician Competency Framework: Better standards. Better physicians. Better care.* 2005, The Royal College of Physicians and Surgeons of Canada.

The Project Group was commissioned to

- prepare a revision of the 2001 Medical Education Blueprint, taking into account the above considerations;
- enter into regular consultations with relevant parties;
- make sure the document was compatible with international and – particularly – European developments;
- produce six-month interim reports to the Medical Education Commission and the Assembly of Deans of Medical Schools;
- produce a final report within 24 months.

## 1.3 Composition of the project group

A core group within the Project Group was charged with preparing the report, consulting with external parties, organizing Project Group meetings, and elaborating the Project Group's conclusions. This core group consisted of the chairperson of the Project Group, the project coordinator, and the secretary; these members of the core group were also members of the Project Group. The Project Group also comprised one member of each university medical centre. The Project Group as a whole was responsible for all final reports.

In putting together the Project Group, the Dutch Federation of University Medical Centres had taken great care to enlist members from different disciplines. Members of the Project Group were appointed as private persons and were not to be considered representatives either of their own institutions or of their own disciplines. An extra member with a background in social medicine was added to the group. The Project Group was at liberty to seek the advice of external experts if necessary. After consultation with the Federation, therefore, the Project Group was widened to include advisory members from the Ministry of Health, Welfare and Sport, the students' organization, the interns' organization, and patients' associations.

Before the Project Group went ahead with its activities, there were some changes in its composition as some members appointed by the Federation changed positions within their Institute or changed jobs. This led to a situation in which all University Medical Centres were indeed represented on the Project Group, but the surgical discipline was not. All new members were appointed

by the Federation's board. Over the course of time, several representatives from the Ministry of Health, Welfare and Sport served as members or agenda members on the Project Group.

The Federation's board appointed the following members on the Project Group:

### Core group

| | | |
|---|---|---|
| chairperson | Professor C.L.A. van Herwaarden | former chairperson and dean of the executive board of the Radboud University Medical Centre |
| project coordinator | Professor R.F.J.M. Laan | chairperson Medical Education Commission of the Assembly of Deans of Medical Schools |
| secretary | R.R.M. Leunissen, MSc | policy officer at the education institute of the Radboud University Medical Centre |

### Other members of the Project Group

| | | |
|---|---|---|
| Amsterdam, AMC | W.M.C. Mulder, PhD | Pharmacology |
| Amsterdam, VUmc | H. de Vries, PhD | General Practice |
| Groningen, UMCG | Professor F.G.M. Kroese | Cell Biology |
| Leiden, LUMC | Professor J.H. Bolk | Internal Medicine |
| Nijmegen, UMCN | Professor B.G.M. van Engelen | Neurology |
| Maastricht, MUMC | Professor A.C. Nieuwenhuijzen Kruseman | Internal Medicine |
| Rotterdam, UMCR | Professor T.J.M. Helmerhorst | Gynaecology/Obstetrics |
| Utrecht, UMCU | Professor E.A.M. Sanders | Paediatrics |
| Amsterdam, AMC | Professor N.S. Klazinga | Social Medicine |

### Advisory members

| | | |
|---|---|---|
| | L. Wigersma, PhD | Royal Dutch Medical Association |
| | M.A.G. van den Berg, PhD | Clients Council of University Teaching Hospitals |
| | L. Schöffer, MSc | National Medical Students Platform |
| | R.A.F. de Lind van Wijngaarden, PhD | National Interns Platform |
| until 1-1-2008: | L.C.C. de Lange, MSc, LL.M | |
| until 1-7-2008: | T. Hoogeveen, MSc | |
| from 1-7-2008: | D.I.M. Hoefnagel LL.M | Ministry of Health, Welfare and Sport |

## 2.1  Modus operandi

The Project Group to Revise the 2001 Medical Education Blueprint first convened on 11 May 2007. At this first meeting, the Project Group was officially launched by Professor Klasen, chairperson of the Federation's Assembly of Deans of Medical Schools. The Project Group convened a total of twelve times, and its last meeting took place in the spring of 2009. So as to minimize travelling time for members of the Project Group, all meetings were held in the Federation building in Utrecht.

The agenda and the procedure of these meetings were prepared by the core group, who prepared documents for meetings and submitted them to the plenary Project Group. When necessary to allow matters to proceed, members of the Project Group were consulted between meetings by e-mail.

In January 2009, a draft Framework was presented at the 2009 Framework conference for invited guests in Utrecht, which included representatives of all scientific societies of advanced medical education and specialist programmes, and representatives of the Royal Netherlands Medical Association; the Ministry of Health, Welfare and Sport; the Ministry of Education, Culture and Science; the Clients Council of University Teaching Hospitals; the National Platform for Medical Students; and the National Interns Platform.

The Framework was discussed in great detail during the conference, leading the Project Group to compose a draft 2009 Framework and to submit it to the Federation board for decision-making. After decision-making, the Federation took care of the dissemination of the Framework.

## 2.2  Choices made

As the Framework was to fit within prevailing legal frameworks, the Project Group first explored legislative developments in the Netherlands and in Europe. Consultations with the Ministry of Health, Welfare and Sport and the Ministry of Education, Culture and Science thus led to the text of **Chapter 3**.

At the same time, the Project Group began to search for a suitable model for describing the physicians' profile. During its first few meetings, the Project Group looked into the Curriculum for the Foundation Year from the UK, the model of Competency-Based Residents' Education from the US, the 2005

CanMEDS model from Canada (Frank JR, 2005), the G2010 Curriculum of the Groningen University Medical Center, and the Basic Physicians' Profile of the VU University Medical Center in Amsterdam.

After careful consideration, the CanMEDS model was chosen because, first, this model involved an excellent and useful division into physicians' roles and competencies in a variety of professional situations, and second, this model was also being used in the framework of the modernization of advanced medical education.

The seven roles or competency domains in the CanMEDS model were discussed at length by the Project Group. In order to invest the physicians' profile with greater vigour, it was decided to use the term 'performance' instead of 'competence' (**Chapter 5**). The profile was then elaborated in terms of key competencies and their constituent sub-competencies (**Chapter 6**).

At the European level, not many arrangements have yet been made to define learning outcomes to be attained by medical graduates, and the Netherlands is still in a unique position owing to its previous Blueprint, which became widely known by its English title as *The Dutch Blueprint*. Quite recently, we saw the publication of the final report of the European Tuning project commission. In this report, experts from various countries listed a European set of learning outcomes. Although this was an EU-funded project, it was not backed by a mandate from any qualified body.

The profile and the competencies in the 2009 Framework were compared with the learning outcomes defined in the Tuning report. This exercise, which was discussed by the Project Group, showed that the learning outcomes in the 2009 Framework did indeed encompass all outcomes from the Tuning report, and that the 2009 Framework was even more detailed, particularly in the domain of academic competencies.

The list of clinical conditions in the 2001 Blueprint comprised about 330 clinical conditions in all. The Project Group wanted to trim down this number to a more manageable set. For alternative models, we investigated classifications in the textbook *Diagnosing Everyday Complaints* (2005 edition), the Calgary List of Clinical Presentations (Mandin, 2005), the VU Medical Center list of clinical conditions (2004), the VU Medical Center list of clinical conditions in the Bachelor's programme, the Leiden University Medical Center list of clinical conditions (2000), and, of course, the list of problems and clinical conditions in the 2001 Blueprint.

**2**

Having considered the issue at length, the Project Group concluded that the phrase 'issues relating to illness and health' was more appropriate to the wide-ranging field in which today's physicians are operating, as a fair share of the physicians' job is not directly patient- or disease-related. The introduction of a list of issues also meant that the list of clinical conditions that was included in the 2001 Blueprint was not to return in the 2009 Framework: on the one hand, the contemplation of each issue would involve a series of clinical presentations anyway, and, on the other, having a list of clinical conditions would require ceaseless maintenance in the wake of ongoing developments in medical disciplines. On the basis of the considerations mentioned above, several conceptual classifications passed in review in Project Group meetings, until we finally arrived at the model as described in **Chapter 7**.

The Project Group was also commissioned to define the learning outcomes of the Bachelor's degree programme in Medicine. As the Project Group felt that Bachelor's students in Medicine do not yet operate in an authentic professional setting, the Bachelor's degree programme was described in terms of knowledge, skills, and behaviour. We used the learning outcomes that had previously been formulated in a joint document of several medical faculties using the Bachelor's-Master's degree structure, with the Dublin descriptors being used as an overall guide (**Chapter 8**).

In the 1994 Blueprint and the 2001 Blueprint, the domain of knowledge only came up to a fairly limited extent. The Project Group felt that the aspect of required knowledge had been somewhat eclipsed by lists of problems, clinical conditions, and skills. Especially the so-called basic sciences, important as they are, had remained underexposed. Right from the start, the Project Group wished to give these basic sciences a more prominent place in medical education. As the model of competencies selected by the Project Group also carried the risk of outlining required knowledge only implicitly, therefore, the 2009 Framework was given a separate Chapter on basic sciences on the medical curriculum (**Chapter 9**).

For the section on 'the Foundation of Medicine in the Natural Sciences', the Project Group conducted a survey among all eight Dutch medical faculties. The results of this survey served as the starting-point for further efforts made by the Project Group, leading to the text in section 9.2 of this Framework.

For the section on 'Aspects of the Behavioural and Social Sciences', the

medical faculties were not consulted by way of a survey. The Project Group used in-place materials from the 2001 Blueprint, the VU Medical Center, and the Radboud University Medical Centre. Several concepts were considered by the Project Group in great detail. The result of this discussion led to the text in section 9.3.

The Appendices to the 2001 Blueprint included a skills list. Spot-checking at the eight Dutch medical faculties showed that all medical faculties still used this list, sometimes with minor adjustments. After discussion in the Project Group, the skills list from the previous Blueprint, with minor adjustments, was added to the Appendices to the 2009 Framework (see Appendix 3).

In the final stages of the production of this 2009 Framework, talks with several organizations, such as Netherlands Association for Medical Education, proved there was a need for competencies to be clearly defined in terms of levels that were to be attained. Therefore, a concise chapter was added (**Chapter 4**) to outline medical education in the Netherlands and to define the levels used in this 2009 Framework.

## 3.1  The higher education and research act

The Higher Education and Research Act aims to establish a single legislative framework for university education, higher professional education, Open University education, and the university teaching hospitals in the Netherlands. In 2002, the Bachelor's-Master's degree structure was introduced in higher education, which established Bachelor's and Master's degree programmes as two independent study programmes. This change followed in the wake of the signing of the Bologna Declaration in 1999. This Declaration aims to promote greater overall convergence in higher education in Europe, based on a two-cycle degree structure involving undergraduate and graduate levels. Worldwide, medical education prior to the gradation of the physician is called 'undergraduate' and after this moment 'graduate' or 'postgraduate'. This document will abide by this common terminology.

In the transitional period, two-cycle and one-cycle programmes have been available simultaneously; both programmes have the same learning outcomes, and their graduates will obtain the degree of Master. Institutions must make sure their students can meet the professional requirements as these have been laid down in ratified EU directives.

At the request of the medical faculties, among others, it is expected that the Higher Education and Research Act is soon to be supplemented with an article (art. 7.2.4.a) providing for the possibility of removing students from an institution by virtue of their unfitness for the medical profession (the so-called *iudicium abeundi*).

## 3.2  The individual healthcare professions act

### 3.2.1  GENERAL

The Individual Healthcare Professions Act provides regulations for health professions recognized by the Minister for Health and for professionals providing care to individual patients in the Netherlands. The Act applies both to independently established professionals and to professionals in employment, and it aims to control and improve the quality of professional training and professional practice. The Individual Healthcare Professions Act became effective for the professional domain of physicians on 1 December 1997.

### 3.2.2 Title protection

The starting-point of the Individual Healthcare Professions Act was that the prohibition for unqualified persons to practice medicine ceased to be valid. With the exception of certain restricted actions, everyone may perform medical actions without requiring a professional title (art. 2.2.3). At the same time, a system of constitutive registration and professional title protection was introduced for those professions that were listed in article 3 of the Act, which included the profession of physician, granting those registered the right to use a legally protected title, and, by using this title, proving to the general public and to healthcare insurers that they are pre-eminent experts in a specific branch of healthcare. Physicians need to satisfy a number of legal requirements for them to be allowed to use the protected title, the most important one being that they must meet educational requirements. The law stipulates that those wishing to register as physicians must be in possession of a certificate proving that they have met the educational requirements decreed by law.

### 3.2.3 Restricted actions

An important part of the Individual Healthcare Professions Act aims to regulate the performance of restricted actions. As indicated above, the starting-point of the Act is that, in principle, everyone may perform medical actions without requiring a professional title. Exceptions have been made for those actions that might put patients at great risk if they were performed by non-specialist practitioners.

The law recognizes the following restricted actions: surgical actions, obstetric actions, catheterization and endoscopy, punctures and injections, anaesthesia, the use of radioactive materials and ionizing radiation, cardioversion, defibrillation, electro-convulsive therapy, lithotripsy, and artificial fertilization. These actions remain subject to qualification requirements, meaning that such restricted actions may only be performed by professionals that are qualified in compliance with the Individual Healthcare Professions Act and have been registered as such. Other professionals, not falling within this explicit category, may exclusively perform those actions under the supervision and guidance of qualified professionals (authorization).

### 3.2.4 Physicians: qualified versus competent

In consequence of the Individual Healthcare Professions Act, physicians are held to be experts in the entire domain of medicine and, hence, are qualified to perform all restricted actions independently. They may decide themselves what actions are indicated and whether they will perform actions themselves or have them performed by other professionals. However, the physicians' qualification to perform restricted actions independently while using the title of physician is restricted by their individual competence required to perform the action adequately. Though novice medical graduates are *qualified* to perform all surgical actions, they are not *competent* in the domain of surgery as a whole and, therefore, may not perform all surgical actions by virtue of the Individual Healthcare Professions Act.

### 3.2.5 The Individual Healthcare Professions Act in relation to the 2009 Framework

The Higher Education and Research Act, besides embracing general articles on education, also includes an article that refers to the Individual Healthcare Professions Act in the matter of specific educational requirements for physicians. The Individual Healthcare Professions Act stipulates that an Order in Council is required to outline the educational requirements of physicians. This Order in Council basically comprises the general learning outcomes and the problems that serve as starting-points for teaching, as these have been laid down in the 2001 Medical Education Blueprint. Therefore, these have obtained legal status and call for the Order in Council to be adjusted if any changes are made to the Framework.

## 3.3 The medical treatment contracts act

On 1 April 1995, the Medical Treatment Contracts Act came into effect. The Medical Treatment Contracts Act aims to strengthen and clarify the legal status of patients in the Netherlands. A basic standard articulated in the Medical Treatment Contracts Act is that health professionals must observe good healthcare practices in their work and must act in accordance with the responsibility ensuing from professional standards applying to healthcare professionals. The physicians' duty to inform the patient and the patient-consent requirement are the most essential requirements for health professionals to

observe in their relations with patients. Professional standards include matters such as domain-specific technical rules, protocols, and specific ethical rules in care provision, or, in sum, the totality of standards generated by science and practice to guide responsible medical performance.

## 3.4 European directive

The design of the present Framework took on board European Directive 2005/36 EC on the recognition of professional qualifications. This directive took effect on 20 October 2007 and replaced fifteen European directives pertaining to professional qualifications, including the so-called Doctor's Directive.

Article 24 of Directive 2005/36 EC presents the minimum conditions that basic medical training has to meet, relating both to the duration of the course of training and to the knowledge and skills that must be acquired. Basic medical education must comprise at least six years of study or 5,500 hours of theoretical and practical training at a university or under the supervision of a university. In addition, the medical curriculum must make sure that students concerned have acquired the following knowledge and skills:

a. sufficient knowledge of the sciences on which medicine is founded and a good grasp of the scientific methods, including the principles of measuring biological functions, the evaluation of scientifically established facts, and the analysis of data;

b. sufficient knowledge of the structure, functions, and behaviour of healthy and sick people, as well as relations between the state of health and the physical and social environment of human beings;

c. sufficient knowledge of clinical disciplines and practices, providing students with a coherent picture of mental and physical diseases, of the preventive, diagnostic, and therapeutic aspects of medicine, and of human reproduction;

d. sufficient clinical experience gained in hospitals under appropriate supervision.

# 4 | Stages, Cycles, and Levels in Medical Education in the Netherlands

Medical education in the Netherlands involves a training sequence with two stages that medical students pass through in succession. The first stage of this training sequence comprises two cycles: a three-year Bachelor's degree programme in Medicine, followed by a three-year Master's degree programme in Medicine.[3] There are two variations on this scheme.

The first variation concerns the intake of students with non-medical Bachelor's degrees into the regular three-year Master's programme in Medicine, after they have taken a transition programme. Regulations for this option have been included in the Education and Examination Regulations of the Dutch Master's programmes in Medicine.

The second variation concerns the Master's programmes themselves. In addition to the regular three-year programmes, there is the option of a four-year research Master's programme, training students to be physicians-researchers in the Netherlands. These programmes are open to students with various preliminary biomedical backgrounds and are subject to selection requirements. Regulations for this option have been included in the Education and Examination Regulations of the four-year research Master's programmes in Medicine.

In the second stage of the training sequence, following upon completion of these Bachelor's and Master's cycles, medical graduates take advanced medical education, training them to be medical specialists in primary or secondary healthcare. Having completed this stage, medical practitioners then engage in lifelong learning activities both in practice and in formal continuing-education courses.

The levels linked to these successive stages may be called starter level, beginning practitioner level, and experienced practitioner level. After completion of their Bachelor's programme in Medicine, medical students can be characterized as starters. These students have a basic body of knowledge and understanding of scientific disciplines that are relevant to their subsequent professional practice. They have also acquired a set of basic skills and show professional

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[3]  Medical education used to involve a one-cycle six-year programme. Meanwhile (April 2009), all Dutch medical faculties have already introduced the two-cycle Bachelor's-Master's degree structure or are preparing its introduction.

behaviour in training-related situations. They can apply knowledge, skills, and behaviour to issues that involve a relatively low level of complexity.

After completion of their Master's or research Master's programme in Medicine, medical graduates can be characterized as beginning practitioners. Newly graduated physicians demonstrate a basic competence in practice, possess an integrated body of knowledge, skills, and professional behaviour, and can handle issues involving higher levels of complexity. Graduates in medicine are capable of performing independent consultations but only perform these under supervision in their advanced medical education.

Permission to use the protected title of physician and qualification – if competent – to perform certain actions reserved to physicians is linked to registration in the Individual Health Care Professions Act register. Registration is only open to those who have completed their degree programmes in Medicine and who, following the introduction of the Bachelor's-Master's degree structure, have therefore obtained the Master of Science (MSc) degree, which students obtain after they have completed their Master's programme in Medicine.

After a number of subsequent years of further schooling, training, and experience in advanced medical education in the discipline of their choice, physicians operate independently without supervision. They are then experienced practitioners or medical specialists. An element of independent practice is participation in inter-professional coaching activities and lifelong continuing-education courses.

This 2009 Framework defines the joint national learning outcomes to be attained by medical students after completing their regular three-year Master's programme in Medicine or their four-year research Master's programme. The Framework thus helps to guarantee to society at large and to patients in particular that medical graduates who are starting out as practitioners have attained a certain professional level. This level is the aggregate of the physicians' target profile (Chapter 5), physicians' competencies to be achieved After completing their Master's programme in Medicine (Chapter 6), and the list of issues relating to illness and health and its explanation (Chapter 7). Additional learning outcomes formulated for the four-year research Master's programme have not been included in this Framework. In addition, the Framework also defines the profile of the Bachelor in Medicine and the learning outcomes of the Bachelor's programme in Medicine (Chapter 8).

## 4

In this Framework, the levels of proficiency to be achieved have been defined in a five-level structure.

## Levels defined up to the beginning practitioner level

**Level I**  **A** Students have knowledge and understanding of those branches of science that are relevant to medicine.

**B** Students demonstrate in standardized situations that they have skills that are relevant to medicine.

**C** Students demonstrate that they possess the basic skills required for professional behaviour.

**Level II** Students use integrated knowledge, skills, and professional behaviour in an adequate* approach to the issues of illness and health incorporated in this Framework. They demonstrate such competence in context-rich training situations.

**Level III** Students adequately* perform the professional activities defined in the physicians' competencies in purpose-designed training situations and/or in simulated professional situations.

**Level IV** Students adequately* and independently perform the professional activities defined in the physicians' competencies in authentic professional situations, having received prior case-specific instruction and being intensively supervised by an experienced practitioner.

**Level V** Students adequately* and independently perform the professional activities defined in the physicians' competencies. An experienced practitioner is immediately available on stand-by and always provides supervision after the event.

* The performance of professional activities is considered adequate if such performance is in line with the current state of science and the prevailing standards and guidelines of the profession. Wherever the Framework mentions activities that, as a rule, span longer periods of time, as in guiding the chronically ill, students demonstrate their competency by adequately performing partial activities.

The five-level structure presented here mainly concerns situations in which students must demonstrate knowledge, skills, and professional behaviour.
At level I, this involves the separate testing of knowledge, understanding, skills, and professional behaviour.

At level II, knowledge, skills, and professional behaviour must be integrated in handling selected issues relating to illness and health. The testing situations in which students demonstrate their competence have been derived from authentic professional situations, and they are context-rich. All issues relating to illness and health incorporated in the Framework must be mastered by medical graduates at this level II proficiency as a minimum.

Levels III, IV, and V are geared towards the actual testing of competencies. Testing competencies means testing the performance of professional activities. Such testing may be designed in a variety of ways, such as direct observation of performance in various situations, or assessment of students' stated motivation for their performance in discussion after the event, allowing students to demonstrate their understanding of the issue presented and the context in which the issue is presented.

Level III type competencies are ones whose testing in authentic professional situations is not always feasible in first-stage medical education. Such 'competencies in development' may then be tested in purpose-designed training situations and/or in simulated professional situations. This level, firstly, involves professional activities that, as a rule, are not left to the performance of beginning practitioners straightaway but that do come within their scope of their experience. Secondly, this level also concerns competencies that involve students' reflection on the development of their professional behaviour. Beginning practitioners demonstrate these activities in purpose-designed training situations, which is not to say that their reflection should not also be based on their own experience in authentic professional situations.

Levels IV and V, the highest levels in the first stage of medical education, do involve testing in authentic professional situations. The difference between both levels lies in the supervision intensity appropriate to the performance of activities by beginning practitioners. Yet higher levels of independent performance, involving supervisor withdrawal, are only achieved in second-stage advanced medical education.

In discussing levels that must be attained, we also need to deal with the level of difficulty of the issues that are presented to students. This level of

difficulty is chiefly determined by the presence of contextual factors. On the one hand, these are medical factors, such as typical and atypical presentations or co-morbidity problems; on the other, they are contextual factors from the psychosocial model. The level of difficulty is then codetermined by the availability of standard solutions to a problem and the applicability of protocols and guidelines. The level of difficulty also lies in the degree to which different physicians' roles must be integrated in dealing with the issue. Graduates in medicine must be able to handle issues involving varying – including higher – levels of difficulty, with the proviso that the degree of required supervision increases with the degree of difficulty of the case presented. In this respect, there is one sub-competency incorporated in the role of medical expert that is of particular importance: students' ability to recognize and name the personal limits to their knowledge and skills and to decide in time if, and, if so, when a third party needs to be called in, including their supervisor.

In acquiring the competencies included in the Framework, students should be intensively exposed to and involved in authentic professional situations in the course of their training and, in doing so, increasingly learn to work autonomously. In the second stage of medical education, students start out as beginning practitioners, and, upon subsequently completing their advanced medical education, are expected to have fully mastered all required competencies. The definitions of competencies in Chapter 6 specify levels (III, IV, or V) that are meant to be attained.[4] These levels, in their turn, affect the design of tests and the choice of testing instruments, which need to specify how the difficulty levels of the presented issues are given due weight. The actual details of such matters and choices come within the sphere of responsibility of the medical faculties themselves.

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[4] The testing of competencies in the final stages of the Master's programme in Medicine presupposes students' participation in authentic professional situations as if they were beginning practitioners. Students can only be expected to have mastered some of the issues relating to illness and health, as their mastery is dependent upon the practical training they engage in at this point. This is why it has been decided that all these issues must be mastered at level II as a minimum requirement, while some of the issues, depending on students' individual practical training choices, will be involved in additional competency testing at levels III, IV, or V.

## 5.1 Introduction

Medical education represents a sequence, with physicians-in-training successively passing through its several stages. In this Chapter, the profile of medical students who have completed their Master's degree programme in Medicine has been outlined in terms of seven roles. These roles have been adopted from the CanMEDS model, which is a commonly accepted model on an international scale. Advanced medical education in the Netherlands also uses this model, though they commonly refer to competency domains rather than roles. In the table below, we have indicated how these terminologies interconnect.

| Roles in medical education Framework | Competency domains in advanced medical education |
|---|---|
| Medical Expert | Medical Performance |
| Communicator | Communication |
| Collaborator | Collaboration |
| Manager | Management |
| Health Advocate | Social Performance |
| Scholar | Knowledge and Science |
| Professional | Professionalism |

By virtue of the Individual Healthcare Professions Act, medical graduates are qualified to practice medicine, including the performance of restricted actions, but they are restrained in their medical performance by their competence.

## 5.2 Physician's profile

The physicians' profile has been defined in conformity with the CanMEDS 2005 model and comprises the following seven roles or competency domains:

- Medical Expert
- Communicator
- Collaborator
- Manager
- Health Advocate
- Scholar
- Professional

Each role mentioned above will be briefly defined below and will be elaborated in greater detail by means of the competencies articulated in Chapter 6 of this Framework.

**MEDICAL EXPERT** As Medical Experts, physicians possess a comprehensive body of knowledge and skills from the medical knowledge domain, which they apply in medical practice. Physicians collect and interpret information, perform problem analyses, make appropriate clinical decisions, and act on their decisions within the confines of their own expertise and competence. Physicians check whether their chosen decisions and accompanying actions are up to the appropriate quality standard and have the desired effect. Physicians deliver care that is in conformity with up-to-date professional standards and that is – inasmuch as possible – evidence-based, ethically sound, and cost-aware. Physicians engage in effective oral, written, and electronic communication with patients, relatives, and other professionals in social services or healthcare.

**COMMUNICATOR** As Communicators, physicians establish and maintain effective relationships with patients, relatives, and other professionals in social services or healthcare. Physicians use their (medical) communication skills in order to provide high-quality care.

**COLLABORATOR** As Collaborators, physicians are team players that effectively work together in multi-disciplinary partnerships in order to accomplish

decision-making on optimum patient care, education, and/or research. Physicians collaborate effectively with patients, specific groups of patients, and other professionals in social services or healthcare. Physicians pass on information, negotiate, manage, perform consultations, and participate in peer assessment.

**MANAGER** As Managers, physicians contribute to decision-making processes on policy and on the allocation of scarce financial, material, and staffing resources. Physicians mutually attune management responsibilities at strategic, tactical, and operational levels both on and off the job. Physicians prioritize, perform, and evaluate tasks, in a team if so required.

**HEALTH ADVOCATE** As Health Advocates, physicians recognize and actively promote the importance of preventive healthcare for the individual patient, for populations of patients, and for society. Physicians advocate this importance to healthcare policymakers and, wherever possible, put preventive healthcare (at primary, secondary, and tertiary levels) into practice.

**SCHOLAR** As Scholars, physicians make scholarly contributions to the assessment, establishment, and understanding of knowledge and skills in healthcare. Physicians engage in teaching tasks and/or facilitate the education of their students, patients, and others. Whenever possible, physicians take clinical decisions that are based on a scientific footing, recognize the importance of lifelong learning, and act as role models for others.

**PROFESSIONAL** As Professionals, physicians play a unique social role in that they are committed to raising the health and well-being of society to the highest possible level. Physicians practise patient care in compliance with the highest medical and ethical standards within Dutch and European legal frameworks. Physicians make a ceaseless effort to acquire full mastery of the standards prevailing in their domain of expertise.

## 6.1 Introduction

We will here outline the competencies pertaining to the roles that have been introduced in Chapter 5. We defined the notion of competency in the following way: a competency is the ability to adequately perform a professional activity in a specific, authentic context, using an integrated body of knowledge, understanding, skills, and professional behaviour. Although the roles as defined in the physicians' profile all match the competency domains in advanced medical education, this is not the case for the detailed definitions of competencies as specified below.

The formulations have been selected to match students' learning outcomes upon completion of their Master's programme in Medicine. In interpreting these formulations, readers should bear in mind that medical students who have completed their Master's programme in Medicine are beginning practitioners: these competencies, therefore, are required at the point when students commence their advanced medical education and need to be more fully developed throughout advanced medical education.

The level in view (III, IV, or V; see Chapter 4) has been specified for each competency below and has been defined as follows:

After completing their Master's programme in Medicine, medical graduates have the ability to perform the professional activity

- in specific, purpose-designed training situations and/or simulated professional situations **(level III)**;
- in authentic professional situations, having received prior case-specific instruction from an experienced professional and under his/her intensive supervision **(level IV)**;
- independently in authentic professional situations, with an experienced professional being immediately available for guidance upon request and for supervision in retrospect **(level V)**.

## 6.2 Competencies

### 6.2.1 MEDICAL EXPERT

After completing their Master's programme in Medicine, medical graduates are able to

1   apply a wide array of knowledge from the medical knowledge domain in medical practice;
    - apply in practice knowledge acquired in medical sciences, basic natural sciences, and the behavioural and social sciences **(V)**;
    - make a mechanism-based analysis of a medical problem if and when appropriate **(V)**.

2   apply in practice diagnostic, therapeutic, prognostic, and individual-oriented prevention skills to a number of defined problems in an effective and ethically responsible way, taking into account sex, age, stage of life, and cultural background;
    - clarify a problem presented by a patient **(V)**;
    - take a medical history **(V)**;
    - provide an assessment of the cognitive, affective, and conative functions **(V)**;
    - perform a physical examination **(V)**;
    - request additional examination, perform it if required, and/or interpret its results **(IV)**;
    - make a problem analysis, using a variety of sources, including medico-scientific literature explaining the phenomena down to a basic level **(V)**;
    - apply clinical reasoning concepts **(V)**;
    - make a differential diagnosis **(V)**;
    - draft a plan for diagnosis and/or therapy **(V)**;
    - implement a diagnostic and/or therapeutic plan **(IV)**;
    - check the effect of the implemented treatment plan **(IV)**;
    - inform or advise patients, relatives, and other people involved on the proposed policy, taking into account patients' personal circumstances and preferences and the physical and emotional burden on patients **(IV)**;
    - apply the range of simple surgical and pharmacological therapies of the discipline **(IV)**;
    - document – in writing or electronically – findings and agreements made

about the patients' problem **(V)**;
- guide patients, relatives, and other people involved **(IV)**;
- recognize and name the personal limits to their knowledge and skills and can decide in time if, and, if so, when a third party needs to be consulted **(V)**;
- refer patients to specialist medical care on the basis of a comprehensive grasp of possible specialist treatments **(IV)**;
- provide basic first aid **(V)**.

3  retrieve relevant information bearing on diagnosis, therapy, prognosis, and individual-oriented prevention and to integrate this information in clinical practice;
- gauge the scientific value of sources of information **(V)**;
- consult written and electronic sources of information and interpret their data **(V)**;
- consult other experts **(V)**.

4  engage effectively in oral, written, and electronic communication with other healthcare professionals about the patients consigned to their care;
- have appropriate proficiency in the Dutch language **(V)**;
- decide when the services of an interpreter are required and know how to call in such services **(V)**;
- show respect and effectiveness in coping with other people's mentalities and other jargon employed by healthcare professionals from other disciplines **(V)**.

5  show medical expertise in situations unrelated to immediate patient care **(IV)**.

6  reflect on their own medical performance and on how this is affected by their own attitudes, standards, and values;
- reflect on the strengths and weaknesses in their own medical performance **(V)**;
- explain and defend moral views to patients and colleagues in social services and healthcare **(V)**;
- acknowledge implicit and explicit moral and ethical issues involved in

practice and critically appraise their own views on what is good medical performance **(V)**;

- articulate their own views on responsibility in concrete situations in patient care and healthcare policy **(V)**.

### 6.2.2 COMMUNICATOR

After completing their Master's programme in Medicine, medical graduates are able to

1 engage in and maintain therapeutic relationships with patients that are based on mutual understanding, empathy, and trust;
   - engage in open and respectful communication and show empathy and commitment **(V)**;
   - apply basic and, if so required, more complex oral communication skills in talks with patients, their relatives, and other social services and healthcare professionals (also included in the Collaborator section) **(V)**;
   - maintain a proper balance between personal and professional roles and show respect for interpersonal differences in professional relationships (also included in the Professional section) **(III)**;
   - have a good command of the Dutch language in speaking and writing **(V)**.

2 collect information about the patient's problem from patients, their relatives, or other relevant people involved in the patients' social circle and can integrate the information they have collected;
   - take a medical history from patients, relatives, or other people in a patient-oriented way, paying attention to both medial and communicative aspects **(V)**;
   - take a medical history from a person other than the patient, if necessary **(V)**;
   - explore patients' call for help **(V)**;
   - maintain open and respectful communication during physical examination **(V)**.

3 discuss relevant information with patients, relatives, other people involved, or other professionals in social services or healthcare with a view to providing optimum healthcare to patients;
   - inform patients, relatives, and other people involved **(V)**;

- advise patients, relatives, and other people involved on matters of diagnosis and proposed policy, while taking into account patients' personal circumstances and preferences and the physical and emotional burden on patients **(IV)**.

4  guide patients and other people involved;
   - motivate and support patients in therapy adherence **(IV)**;
   - adequately guide patients and other people involved after delivery of bad news **(III)**;
   - guide the chronically or incurably ill and guide patients in palliative care **(III)**.

5  adequately deal with diverse groups of patients, such as children, senior patients, men and women, and patients with different cultural backgrounds;
   - possess knowledge and skills for coping with intercultural situations in healthcare and can evaluate their own strengths and weaknesses in this respect **(V)**;
   - take into consideration possible ethnic, cultural, or social backgrounds that may impact the delivery of healthcare to individuals in society (also included in the Professional section) **(V)**;
   - conduct a conversation with patients and their relatives (dialogue) **(IV)**;
   - conduct a conversation with patients while taking their age into account **(V)**.

### 6.2.3 Collaborator

After completing their Master's programme in Medicine, medical graduates are able to

1  effectively collaborate with other healthcare professionals in social services and healthcare, in consultation with patients;
   - develop a healthcare plan for patients in consultation with other healthcare professionals and patients themselves and can supervise its implementation **(IV)**;
   - apply basic and, if so required, more complex oral communication skills in talks with patients, their relatives, and other social services and healthcare professionals (also included in the Communicator section) **(V)**.

2 make an effective contribution to interdisciplinary teams in the fields of patient care, education, and research;
- collaborate in teams (also included in the Manager section) **(IV)**;
- show an ability to accept, consider, and respect other team members' opinions in order to promote decision-making **(V)**;
- show an understanding of group processes and their impact on the healthcare process **(V)**.

### 6.2.4 MANAGER

After completing their Master's programme in Medicine, medical graduates are able to

1 use information technology purposively and effectively;
- use computerized equipment in medical practice **(V)**;
- use electronic patient administration and/or electronic patient files **(V)**;
- handle safety issues involved in electronic patient information flows **(V)**.

2 adequately organize their own tasks, taking into account the work-related context;
- distinguish between main issues and side issues **(V)**;
- organize and prioritize tasks **(V)**;
- collaborate in teams (also included in the Collaborator section) **(IV)**;
- spot organizational problems in work and can identify their possible causes **(III)**.

3 prove to be well informed about the Dutch healthcare system and how this is impacted by social and political developments. They deploy this knowledge effectively and efficiently to benefit their own position and/or organization;
- apply knowledge of the structure, operation, and funding of the Dutch social services and healthcare system in practice **(V)**;
- take adequate decisions on the effective deployment of limited healthcare resources and take decisive action in such matters **(III)**.

4 apply the principles of quality healthcare (control, improvement, and guarantee) in practice.
- recognize critical situations and risks in time and respond to them adequately **(III)**;

- apply a quality model in practice if this is relevant **(III)**.

### 6.2.5 HEALTH ADVOCATE

After completing their Master's programme in Medicine, medical graduates are able to

1  apply their knowledge of the determinants of illness and health in practice and support measures that promote the health of individuals and groups;
    - show an understanding of factors that may influence health, including behavioural, genetic, psychosocial, economic, and biological factors **(V)**;
    - show an understanding of aetiology and pathogenesis as steps leading from health to illness **(V)**;
    - spot and seize opportunities for interventions at different levels **(V)**;
    - show an understanding of the way in which healthcare policies are designed and can apply methods for influencing developments in healthcare **(III)**.

2  recognize high-risk determinants of health at the level of the individual, groups and patient groups, and society;
    - collect information on determinants of health at the individual patient level and the group level and can integrate this information in their medical performance **(V)**;
    - apply knowledge of epidemiology in practice at the individual patient level **(V)**;
    - apply knowledge of epidemiology in practice at the level of groups, patient groups, and society (also included in the Scholar section) **(III)**.

3  respond adequately to high-risk determinants of health at the level of the individual, groups and patient groups, and society;
    - be aware of the consequences of their own (infectious) diseases for patients and adjust their behaviour accordingly **(V)**;
    - apply knowledge of health education in practice and name the effects of preventive measures in relation to health education models **(III)**;
    - understand their position as physicians in healthcare and recognize their role as exemplars **(III)**.

### 6.2.6 SCHOLAR

After completing their Master's programme in Medicine, medical graduates are able to

1 design and implement a small-scale empirical scientific research project;
   • formulate a problem definition and a research question **(V)**;
   • conduct a literature survey **(V)**;
   • draft a simple methodologically sound research design **(V)**;
   • collect data **(V)**;
   • perform simple data cleaning and data entry tasks **(V)**;
   • perform simple statistical analysis **(V)**;
   • report research results in writing **(V)**;
   • present and discuss research outcomes **(V)**.

2 deliver education to patients, students, and healthcare professionals;
   • design and deliver education to patients, students, and others **(III)**;
   • apply educational principles in their dealings with patients, students, and healthcare professionals **(V)**;
   • assist others in identifying their learning needs **(V)**.

3 apply the principles of critical thinking to medical information sources (literature, books, the Internet, etc.) and in interaction with others;
   • make a hypothesis **(V)**;
   • approach a healthcare problem systematically by means of models and (decision-making) theories **(V)**;
   • to handle information supplied by interested parties with objectivity and good sense **(V)**;
   • draft clinical protocols for the benefit of patient care **(III)**.

4 involve any available scientific evidence in concrete decisions in clinical practice, if possible;
   • take diagnostic or therapeutic decisions that are based on evidence-based medicine, if possible, and take on board the bounds of the possible and the impossible **(V)**;
   • perform a literature survey for a concrete patient-related problem **(V)**;
   • apply knowledge of epidemiology in practice, at the level of the individual patient (also included in the Health Advocate section) **(V)**;

- apply knowledge of epidemiology in practice, at the level of groups, groups of patients, and society (also included in the Health Advocate section) **(V)**.

5 develop, implement, and document a personal learning strategy;
- identify personal learning needs and can design a suitable plan of study or further training **(III)**;
- maintain and improve their own professional competence by continuously informing themselves of the main developments in medical science **(III)**;
- integrate newly learned matter in practice **(III)**;
- test themselves and others **(III)**.

6 reflect on strengths and weaknesses in their own professional performance and, in that way, can guide their own learning process and accept responsibility for their own professional growth, aiming to engage in lifelong development as physicians.
- assess whether the development of their various competency domains is at the requisite level and, if such is not the case, can analyse which skills, knowledge domains, or personal aspects require additional attention **(III)**;
- take adequate action with a view to raising their competencies up to the desired level **(III)**;
- make a well considered career choice that matches their own capabilities **(III)**.

### 6.2.7 PROFESSIONAL

After completing their Master's programme in Medicine, medical graduates are able to

1 deliver high-quality care in an honest, committed way, paying attention to the patient's integrity;
- handle possible ethnic, cultural, or social backgrounds that may impact the delivery of healthcare to individuals in society (also included in the Communicator section) **(V)**;
- respect the boundaries of patients' private lives if these are outside the healthcare framework **(V)**;
- terminate a doctor-patient relationship in a professional way **(IV)**.

2  demonstrate professional behaviour in healthcare, scientific research, and education;

- to handle information supplied by interested parties with objectivity (also included in the Scholar section) **(V)**;
- maintain a proper balance between personal and professional roles and show respect for interpersonal differences in professional relationships (also included in the Communicator section) **(III)**;
- recognize (medically) unprofessional behaviour and can specify adequate courses of action to be taken in such matters **(III)**;
- show an understanding of the importance of maintaining relations with interested parties in healthcare on the basis of openness and integrity and can promote the interests of patients and patient groups in such relations **(III)**.

3  practise medicine in an ethically responsible way and respect the medical, legal, and professional obligations inherent in membership of a self-regulating group;

- accept responsibility for their own professional performance and are prepared to accept standards of accountability **(V)**;
- recognize ethical dilemmas and know how to handle ethical concepts that are relevant to healthcare practice **(V)**;
- make allowance for patients' position of dependence **(V)**;
- register feelings of dissatisfaction with the doctor-patient relationship either in patients or in themselves and know how to bring them into the open **(V)**;
- show knowledge of legal concepts in healthcare and apply these in practice **(V)**;
- recognize and acknowledge medical mistakes and know how to report these to the competent authorities **(III)**;
- show an understanding of the interests of their professional group and can specify how these can be promoted **(III)**.

4  reflect on their own performance in medical practice in relation with their own feelings and cognitions;

- show an understanding of the insecurities inherent in their own medical practice and know how to handle these **(III)**;

- reflect on their own performance in difficult, overwhelming, or shocking situations; have an awareness of their own feelings, values, and standards as related to existential questions of life, death, illness, and health **(III)**;
- handle adequately their own mistakes or those of others, admit their own mistakes to patients and colleagues, and can learn lessons from mistakes **(III)**;
- reflect on the interaction between the job and private life, recognize imbalances in the work-life relation, and respond to them adequately **(III)**;
- show an understanding of their own feelings, inhibitions, standards, and values as related to feelings – such as irritation, repugnance, shame, affection, love, and eroticism – evoked by contacts with patients or people in the patients' immediate environment **(III)**.

## 7.1 Introduction

The central role in the physicians' profile is their role as Medical Expert. In addition, six other roles or competency domains have been outlined (Chapter 5), and all competency domains have been elaborated in terms of sub-competencies (Chapter 6). The sub-competencies pertaining to the role of Medical Expert refer to issues relating to illness and health with which physicians should have familiarized themselves. These issues have been outlined in the present Chapter, and, taken together, cover the domain of expertise of each medical graduate. All seven roles are vital in dealing with issues in practice.

This list of issues has been sub-divided into several categories.
- The first and most voluminous category comprises the complaints that induce patients to consult physicians. Within this category, we have purposely opted for an arrangement deleting headings referring to regions, organs, or organ systems, and presenting instead a categorization of complaints into six main groups: general, discoloration, pain, swelling, discharge, and impaired function.
- The next two smaller categories deal with findings upon physical and additional examination. In these categories, we have only included those findings that are likely to serve as a starting-point for a process of clinical reasoning in themselves, i.e., even without any immediately apparent complaints. In analysing patients' complaints, physicians will also encounter other findings produced by physical or additional examination. Their interpretation of such findings also belongs to the process of clinical reasoning and clearly comes within the compass of the physicians' sphere of activity.
- The final category comprises a list of so-called healthcare issues, involving issues of prevention, early detection, acute and intensive care, consequences of chronic illness, specific stages of life, social context, and anomalous care consumption.

In Chapter 4, we have already explained that newly graduated physicians must be able to apply their knowledge, skills, and professional behaviour in an integrated way in dealing with the issues of illness and health that have been

included in this Framework. In this context, we will here once more summarize what knowledge beginning practitioners must have. Graduates in medicine have knowledge and understanding of the (patho-)physiological backgrounds, psychosocial factors, natural courses, differential diagnostics, diagnostic methods, and preventive and therapeutic options relevant to the issue at hand. With reference to differential diagnostics, physicians should be able to establish a hierarchy, taking into account urgency, incidence, sex, age, cultural factors, and other contextual factors, including patients' case histories. The knowledge that must be acquired by newly graduated physicians includes their awareness of what issues require specific expertise and referral to specialized health professionals.

Clinical conditions and groups of clinical conditions relevant to a particular issue obviously have a role to play in acquiring such knowledge. It has been left up to the medical faculties themselves to decide what clinical conditions need to be studied in what degree of detail, in what way, and in what stage of medical education. Such choices will be guided by considerations such as their seriousness, their frequency of occurrence, and their value as educational models. Similar considerations are likely to guide the study of diagnostic, preventive, and therapeutic options. Required knowledge and understanding will generally tend to focus on major outlines. However, beginning practitioners will need to have more in-depth knowledge of frequently applied methods or interventions so as to justify their independent performance in practice.

In each and every case, medical graduates must take into account – and, hence, be informed about – the importance of contextual factors in establishing diagnostic and therapeutic policy. This is particularly relevant for patients in certain stages of life, such as infant and aged or highly aged patients.

## 7.2 Issues relating to illness and health

### 7.2.1 Patients' complaints

1 General
    1 Increase in weight
    2 Loss of weight
    3 Poor appetite
    4 Fever
    5 Fatigue
    6 Itching
    7 Anomalous growth and development

2 Discoloration
    1 Redness of the skin and/or mucous membranes (local or general)
    2 Paleness of the skin and/or mucous membranes
    3 Blue discoloration of the skin and/or mucous membranes (local or general)
    4 Yellow discoloration of the skin and/or mucous membranes
    5 Black discoloration of the skin

3 Pain
    1 Painful skin
    2 Headache
    3 Facial pain
    4 Earache
    5 Painful eye
    6 Pain in the oral cavity or jaws
    7 Sore throat
    8 Pain in the chest
    9 Painful breasts
    10 Abdominal pain
    11 Neck pain
    12 Backache
    13 Pain in the arm
    14 Pain in the leg

15 Pain in or around a single joint (shoulder, elbow, wrist, hand, hip, knee, ankle, foot)

16 Pain in the locomotor system

17 Painful urination

18 Painful defecation

19 Painful menstruation

20 Pain in the female sex organs

21 Pain in the male sex organs

4 Swelling

1 Local swelling of the skin (including pustules)

2 Swelling in the neck

3 Swelling of the eyelid

4 Swelling in the armpit

5 Swelling in the groin

6 Lump in the breast

7 Swelling in the abdomen

8 Swelling of an extremity (diffuse or local)

9 Swelling of a joint

10 The external female sex organs

11 The external male sex organs

5 Discharge

1 Discharge from a skin disorder (including pustules or vesicles)

2 Discharge from the ear (runny ear)

3 Discharge from the eye

4 Discharge from the nose

5 Discharge from the nipple

6 Discharge from the vagina

7 Discharge from the penis

6  Impaired function

| | |
|---|---|
| 1 | Flaky skin |
| 2 | Wounds and ulcers of the skin and/or mucous membranes |
| 3 | Changes in perspiration |
| 4 | Hair loss |
| 5 | Changed pattern of hair growth |
| 6 | Deviations in nails |
| 7 | Dry skin and/or mucous membranes |
| 8 | Abnormal bleeding tendencies (spontaneous bleeding, subsequent bleeding, bruises) |
| 9 | Abnormal thirstiness |
| 10 | Slowness |
| 11 | Altered perception of temperature |
| 12 | Red eye |
| 13 | Deteriorating vision |
| 14 | Double vision |
| 15 | Squinting |
| 16 | Hearing impairment, deafness |
| 17 | Whistling in the ear |
| 18 | Dizziness |
| 19 | Tendency to fall |
| 20 | Swallowing difficulties; choking |
| 21 | Speaking difficulties |
| 22 | Hoarseness; vocal changes |
| 23 | Blocked nose |
| 24 | Nosebleed |
| 25 | Loss of smell and/or taste |
| 26 | Shortness of breath |

27  Palpitations of the heart

28  Coughing, productive or non-productive (including haemoptoea)

29  Nausea
30  Vomiting (including vomiting blood)
31  Impaired passage of food through the oesophagus
32  Heartburn
33  Diarrhoea
34  Constipation
35  Changed pattern of defecation (including incontinence)
36  Rectal loss of blood (including melaena)

37  Excessive production of urine
38  Too little production of urine
39  Urination problems
40  Blood in urine
41  Urinary incontinence

42  Impaired libido
43  Impaired sexual potency
44  Impaired ejaculation
45  Frigidity
46  Vaginismus
47  Dyspareunia

48  Amenorrhea / oligomenorrhea
49  Hypermenorrhea / menorrhagia
50  Irregular cycle
51  Fertility issues
52  Problems during pregnancy: the mother
53  Problems during pregnancy: the fetus
54  Problems during pregnancy: vaginal loss of blood
55  Problems during or concerning childbirth
56  Problems during confinement
57  Prolapse complaints

### 7.2.2 Findings upon physical examination

1   Abnormal findings upon inspection (including abnormal body size in relation to age; abnormal physique; macrocephaly/micocephaly; hypertonia/hypotonia; abnormal locomotion; abnormal movement; inadequate contacting skills; being ill, not being ill, being toxically ill)

2   Abnormal findings upon percussion (including enlarged liver or spleen; anomalous lung boundaries)

3   Abnormal findings upon auscultation (including abnormal heart sounds or lung sounds)

4   Abnormal findings upon palpitation (including oedema or dehydration; swelling of the lymph nodes; swelling in the abdomen or small pelvis)

5   Abnormal findings upon further physical examination (including high or low blood pressure; pupillary irregularities)

### 7.2.3 Findings upon additional examination

1   Anaemia

2   Polycytemia

3   Leucopenia

4   Leucocytosis

5   Thrombopenia

6   Thrombocytosis

7   Elevated Erythrocyte Sedimentation Rate (ESR)

8   Renal disorders

9   Proteinuria

10  Abnormal urine sedimentation

11  Abnormal liver enzymes

12  Abnormal electrolytes

13  Elevated cholesterol and/or triglycerides

14  Hyperglycaemia or impaired glucose tolerance

15  Abnormal ECG

16  Abnormal thorax X-ray

### 7.2.4 Healthcare issues

1 Prevention
    1 Focusing on general lifestyle indicators (nutrition, stimulants, physical exercise)
    2 Focusing on the living and working environment
    3 Prevention of infections and contamination
    4 Prevention of cardiac and vascular diseases
    5 Prevention of inherited and other congenital disorders
    6 Prevention of growth and developmental disorders

2 Early detection
    1 Abnormal findings upon examination of healthy people
    2 Impaired growth and development
    3 Malignant diseases
    4 Familial tumours
    5 Depression
    6 Dementia

3 Acute and intensive care
    1 Circulation and apnoea
    2 Patients in shock
    3 Patients in coma
    4 Patients with serious (poly-)trauma
    5 Patients with serious burns
    6 Patients with post-operative problems

4 Consequences of chronic illness
    1 Consequences of unexplained physical complaints
    2 Physical disorders, restrictions, and handicaps
    3 Mental disorders, restrictions, and handicaps
    4 Cognitive disorders, restrictions, and handicaps
    5 Marking patients down for facilities

**7**

## 8.1    Introduction

In the wake of the introduction of the Bachelor's-Master's degree structure in Dutch higher and university education, there has been extensive discussion in the domain of medical education on its implications for the medical curriculum. The outcomes of this discussion have been laid down in the report *The Future Physician: a New Educational Continuum* (2002) by the Medical Educational Continuum Project Group and in the report *Tomorrow's Healthcare* (2003) by the Educational Continuum Implementation and Task Reallocation Commission. The recommendations of both reports have been adopted by the Dutch Minister for Education, Culture and Science. At present, the Dutch medical faculties either have already introduced the Bachelor's-Master's degree structure into their medical curricula or are preparing its introduction. At the European level, the Bachelor's-Master's degree structure has only been introduced in medical curricula on a limited scale.[5]

The introduction of the Bachelor's-Master's degree structure involves the introduction of two separate degree programmes: the Bachelor's and the Master's programme in Medicine. This structure offers students the opportunity to make a new choice after they have obtained their Bachelor's degree, which also represents the potential added value of the Bachelor's-Master's degree structure. Most students will opt to take the Master's degree programme in Medicine at the same institution; students are now also entitled to enrol in so-called transitional Master's programmes at their home university.

However, students are also at liberty to make other choices. Some of them may opt to continue their medical education at another university. The receiving institutions, however, are not obliged to admit these students into their Master's programmes, their local intake capacity being a major restrictive factor and being first allocated to admission of their home Bachelor's students. Other students can exclusively be admitted inasmuch as the institutions' intake capacity allows it.

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[5] Patricio M, Den Engelsen C, Tseng D, Ten Cate O: Implementation of the Bologna Two-Cycle System in Medical Education: Where Do We Stand in 2007? – Results of an AMEE-MEDINE survey. *Medical Teacher* 2008;30:597-605.

The Project Group argues that Master's degree programmes should exercise restraint in formulating additional admission requirements for students who obtained their Bachelor's degrees elsewhere. The Project Group feels that the learning outcomes defined in the present Chapter sufficiently guarantee students' attainment levels while recognizing that, owing to curricular differences, Bachelor's students from different institutions are not identical. The Project Group feels, however, that such differences should be resolved within the Master's programme concerned.

A small portion of students may decide to enter the labour market or transfer to a Master's programme other than a medical one. As things are, there are but few non-medical Master's programmes that follow on to a Bachelor's programme in Medicine, but this may change in years to come. Conversely, students with non-medical – mostly biomedical – Bachelor's degrees may also seek admission to Master's degree programmes in medicine. In this case too, capacity constraints will limit the number of students that can be admitted. The Project Group feels it is appropriate that additional requirements be made upon such students to prepare them properly for a Master's degree programme in Medicine. In this case too, however, the Commission recommends exercising some restraint. The profile and learning outcomes of the Bachelor's degree programme in Medicine should first and foremost be considered as exit requirements rather than as entry requirements for the Master's programme in Medicine. A similar situation is at hand in the four-year physician-researcher programmes, which admit Bachelor's students with various backgrounds in the biomedical sciences.

It remains the principal aim of the Bachelor's degree programme in Medicine to prepare students for the Master's programme in Medicine. The profile and learning outcomes of the Bachelor's programme, therefore, should mainly be interpreted as an account of what medical students must attain for them to be properly prepared for the Master's programme. The Bachelor's programme in Medicine must have a clearly medical character for both students and the programme to be in a position to assess whether students will be able to successfully complete the Master's programme in Medicine. For this reason, the profile of the Bachelor's programme in Medicine is also based on all physician roles laid down in Chapter 5 of this 2009 Framework.

**8**

As the Bachelor's cycle does not directly prepare students to work in an authentic health care environment, it would be inappropriate to formulate the bachelor learning outcomes purely in terms of competencies. The learning outcomes of the Bachelor's programme, therefore, have been formulated in terms of knowledge, understanding, skills, and professional behaviour. Taken together, these serve as the foundation for the subsequent development of competencies as described for the Master's programme in Medicine.

## 8.2  Profile of bachelors of medicine

After completion of the Bachelor programme in medicine Bachelors:

- have acquired demonstrable knowledge, understanding, skills, and professional behaviour that are related to the competencies defined in the 2009 Framework for medical graduates, conforming with the seven roles distinguished in the Framework (Medical Expert, Communicator, Collaborator, Manager, Health Advocate, Scholar, and Professional) and reflecting recent developments in those domains of science that are relevant for medicine;
- are able to apply their knowledge, understanding, and skills in a professional way so as to be able to function in healthcare and in training situations relevant to the medical sciences;
- are able to collect and interpret data relevant to the domain of the medical sciences with the aim of making an assessment that takes on board their consideration of relevant social, scientific, and ethical aspects;
- are able to transfer information, ideas, and solutions to audiences that may either include or exclude medical experts;
- possess learning skills required for advanced study involving high levels of autonomy.

## 8.3 Learning outcomes of bachelors of medicine

### 8.3.1 KNOWLEDGE AND UNDERSTANDING

After completion of the Bachelor programme in medicine Bachelors have acquired knowledge and understanding relating to:

1 **Medical sciences**

the medical process

1 the basic concepts of the consultation ('complaint', 'illness', 'reason for visit', 'healthcare question', 'medical history', 'examination', 'differential diagnosis', 'diagnosis', 'treatment', 'guidance')

2 types and stages of consultations, and the roles of physicians and patients in these

3 the significance of contextual factors such as the family, socio-economic variables, ethnicity, culture, and beliefs for the medical process and the methods used for collecting such information

4 differences between various types of care, such as curative, symptomatic, rehabilitative, palliative, and preventive care

5 different kinds of clinical reasoning and their value in different circumstances

6 classification systems of complaints, diseases, and consequences of diseases

medical-professional behaviour

7 the three dimensions constituting the concept of professional behaviour (task management, relation management, and self-management)

8 the core of professional medical behaviour as stated in the Hippocratic oath and in the rules of professional secrecy

a selection of illness and health issues from the list included in the 2009 Framework

9 pathological and pathophysiological backgrounds relevant to the issue

10 psychosocial factors relevant to the issue

11 preventive options relevant to the issue

12 diagnostic methods relevant to the issue

13 the natural course relevant to the issue

14 therapeutic options relevant to the issue

**8**

medico-scientific knowledge and its systematic application

15   the structure of medical databases and strategies for retrieving literature from the physical and electronic medical library

16   the structure of scientific medical publications

17   aspects relevant for analysing a scientific publication (such as validity, reliability, and generalizability)

18   the methodology of Evidence-Based Medicine

19   the principles of medical decision-making

epidemiology and research methodology

20   concepts used in describing disease probability

21   disease prevention in the population at large

22   concepts relevant for understanding aetiological research and research designs suitable for this type of research

23   concepts relevant for understanding prognostic research and research designs suitable for this type of research

24   concepts relevant for the practical application of diagnostic methods and for understanding studies on diagnostic methods, including the research designs suitable for this type of research; diagnostic methods also comprise methods for monitoring patients with chronic disorders and for assessing treatment effects

25   concepts relevant for understanding studies on therapy effectiveness, in terms of effectiveness, costs, and safety, and research designs suitable for this type of research

26   medical-ethical assessment of scientific studies

medical statistics

27   concepts from descriptive statistics, such as normality and abnormality, central tendency and variance, and their attending graphic representations

28   the concepts of statistical significance and confidence interval

29   the chi-squared test, the t-test, analysis of variance, and advanced methods of analysis such as survival analysis, regression analysis, and meta-analysis

**2  The foundation of medicine in the natural sciences**

1   the structural and physiological properties of the main molecules and molecule systems in living nature and the connections between them

2   the structural and physiological properties of living cells and the connections between them

3   the structural and physiological properties of tissues, organs, organ systems, and the organism and the connections between them

4   the origin, development, growth, sexual maturity, ageing, and death of an organism

5   the connections between genetic information and the related phenotype and the influence of non-genetic factors on this phenotype

6   homoeostasis at each level, causing the organism to adapt to circumstances and to communicate with its environment

7   responses to damage or threats to structural or functional integrity at molecular, cellular, tissue, organ, and organism levels

8   the physiological and pathological relations between host and micro-organisms

9   environment- and food-related diseases and their pathogenesis

10  the physiological mechanisms of degeneration, decline, and ageing and their structural and physiological/pathophysiological consequences

11  the main aspects of aetiology, pathogenesis, and pathophysiology of neoplasia at the level of the cell, tissue, the organ, and the patient

12  the research methods and measuring methods commonly used in medicine, relating to the structure and function of molecules, cells, tissues, organs, and organisms

13  the basic aspects of therapeutic performance

**3  Aspects deriving from the behavioural and social sciences**

the medical process

1   theoretical backgrounds of doctor-patient communication

2   psychological and sociological models of illness and health

3   possibilities for behavioural adjustments in order to promote health

4   mechanisms underlying the cause and maintenance of psychological complaints and disorders

5   mechanisms underlying the cause and maintenance of physical complaints that cannot be explained (somatization)

6    the most common kinds of psychotherapy

the behavioural and social sciences

7    the normal psychological and social characteristics of human beings

8    the composition of Dutch society

meta-medical sciences

9    the philosophical context of medical performance

10   the general foundations of medical ethics

11   the distinction between scientific and non-scientific knowledge

12   the outlines of the scientific history of medicine

the organization of healthcare and quality healthcare

13   the way in which healthcare has been organized in the Netherlands

14   non-hospital-based care, the healthcare chain, and disease management

15   the main legal aspects of healthcare

16   healthcare funding

17   aspects of quality healthcare

18   ways in which new insights can be implemented in practice

19   the main aspects of guidelines, standards, and protocols

## 8.3.2 Skills

After completion of the Bachelor programme in medicine and in level- and complexity-geared training situations Bachelors are able to:

1   general

    1   engage in a safe and effective professional relationship

2   medical history

    1   take a medical history, while integrating medical knowledge and communicative skills

3   physical examination

    1   perform a physical examination

4   clinical reasoning

    1   formulate several relevant hypotheses on the basis of presented complaints and clarifying questions

    2   ask additional medical history questions and perform additional physical examination on the basis of hypotheses

    3   interpret the findings of medical history and physical examination

    4   make a proposal for additional examination

5 assess the seriousness and urgency of a situation and outline an expected course

6 formulate a proposal for a treatment plan

7 indicate if and how the medical process is influenced by contextual factors, such as gender, age, ethnic diversity, and multicultural aspects

8 indicate if and how the medical process is influenced by factors from the social context, such as education, profession, work, and lifestyle

5 specific therapeutic skills

1 recognize circulatory arrest and perform resuscitation in line with a specified protocol

2 recognize airway obstruction and perform adequate treatment in line with a specified protocol

3 provide first aid to victims of casualties in line with a specified protocol

6 communication

1 apply basic receptive skills (observation and self-observation)

2 apply basic reactive skills to explore patients' frame of reference (such as open questions, explorative follow-on questions, affirmation, summarizing, and emotional reflection)

3 apply basic reactive skills to structure, guide, and test the communication in order to use their own medical expertise in the consultation

4 supply relevant information in ways that are easy to understand by patients

7 the practice of science

1 apply the successive steps in the process of Evidence-Based Medicine (formulating a question, formulating and implementing a search strategy, selecting and assessing information found)

2 critically appraise medico-scientific literature

3 formulate a research question and write a research proposal under supervision

8 oral and written presentation

1 orally present an individual case and specific questions related to it to lecturers and fellow students

2 produce a written summary of data collected on an individual case and the considerations relevant to this case

3 present an oral and written summary of medico-scientific literature (one or several papers) relevant to a specific question

### 8.3.3 PROFESSIONAL BEHAVIOUR

After completion of the Bachelor programme in medicine Bachelors are able to:

1 task management
    1 dedicate themselves to the acquisition of competencies that are fundamental for physicians
    2 show responsibility and autonomy in carrying out training-related assignments
    3 point out the limits of their competence and act accordingly in training situations
    4 participate in team competencies and demonstrate forms of collaborative behaviour in training situations

2 relation management
    1 elicit information from the patients' perspective in training situations (keywords: empathy, open-mindedness, searching for contextual information, taking into account the emotional significance of information)
    2 deliver information made to the patient's measure in training situations (keywords: tuning in to the patients' emotions and powers of comprehension, making things concrete, verifying)
    3 attune their own competency to the patients' perspective in training situations that focus on decision-making (keywords: encouraging patients to reply, making things explicit, negotiation, meta-communication, implementation of informed-consent procedures)

3 self-management
    1 reflect on their own behaviour and its underlying dynamics (keywords: self-observation, learning to understand one's own emotions, motivation, cognitions (including values, standards, and prejudices), the personal development history of cognitions and their effect on their own behaviour)
    2 submit their self-reflection to other people's judgement; are open to and encourage feedback on and criticism of their own behaviour
    3 use self-reflection and feedback to design and experiment with alternative behaviours.

## 9.1 Introduction

In formulating learning outcomes in terms of competencies, we run the risk of obscuring required underlying knowledge. This is particularly true for the basic sciences that underpin the medical sciences. Medical education in its totality, both in the Bachelor's and in the Master's cycle, ought to centre on the clinical sciences with a foundation in basic sciences. In order to render these basic sciences more distinctive in the medical curriculum, the present Chapter has been added to the 2009 Framework. Here, the basic sciences have been divided into two distinct categories: A) the natural sciences and B) the behavioural and social sciences.

The definitions used below (in terms of 'knowledge and understanding of') have been specified in greater detail by the keywords mentioned below them, which provide for a more detailed but not finite definition. The whole should be considered as a minimum set of required basic knowledge on the medical curriculum. The Project Group has deliberately refrained form suggesting how these knowledge domains could be distributed over the Bachelor's and Master's cycles, which comes within the responsibility of the individual medical faculties themselves. It would seem self-evident for the bulk of basic sciences to fit into the Bachelor's cycle. However, this does not preclude the Master's cycle from raising new subject matter in addition to going back to Bachelor's subject matter.

## 9.2 Foundation of medicine in the natural sciences

### 9.2.1 Structure and function

1   After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the structural and physiological properties of the major molecules and molecules systems in living nature, and the connections between them.
    Keywords:
    - structure, function, and biosynthesis of proteins, fats, and sugars, and the regulatory mechanisms involved in these
    - interactions of macromolecules in macromolecular complexes and cellular organelles

- storage and transfer of genetic information, including repair mechanisms in occurring defects
- enzymes and enzymatic reactions
- signal transduction and its regulation

2  After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the structural and physiological properties of the living eukaryotic cell, and the connections between these.
Keywords:
- cell membranes and membrane transport
- structure and function of cell organelles and intracellular compartmentalization
- energy metabolism (anabolism and catabolism)
- regulatory mechanisms of gene expression
- cell division and cell death, and the regulatory mechanisms involved in these
- cell communication with the external world
- cell movement
- cell differentiation and functional aspects of cell specialization; stem cells
- structure and function of basic tissues

3  After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the structural and physiological properties of cells, tissues, organs, organ systems, and the human body, and the connections between these.
Keywords:
- functional microscopic organization of organs
- functional structure and topography of the human body
- imaging techniques as related to the body's structure and function
- general physical aspects of physiology
- uptake and release of substances, food, and nutrients
- breathing
- posture and movement
- reproduction

- the integrated operation of several organ systems:
  - the nervous system and the senses
  - the locomotor system
  - blood and the cardiovascular system
  - the respiratory system
  - the gastro-intestinal system
  - the urogenital system
  - the endocrine system
  - the immune system
  - the skin

4  After completing their Master's programme in Medicine, medical graduates are aware that an organism pursues homeostasis at each level, adapts to circumstances, and communicates with its environment.
Keywords:
- homeostasis, physiological regulatory systems and their mutual relations: endocrine, neurological, and neuro-endocrine regulation
- the central and the peripheral nervous system; the autonomous nervous system
- temperature regulation, acid-base balance, and electrolyte composition
- interaction with the environment and the body's adaptations to circumstances
- exertion- and stress-induced changes in the body
- day/night rhythm and its disturbance

### 9.2.2 Development

5  After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the origin, development, growth, maturation, and death of an organism.
Keywords:
- sexual reproduction: gametogenesis and fertilization
- development of the embryo and organogenesis
- pregnancy
- molecular and cellular principles in the programmed development of the fertilized egg-cell into multi-cellular organisms
- congenital defects and external influences on their cause
- normal physiological growth and development of the human being

6  After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the connections between genetic information and the accompanying phenotype. Physicians know and understand the influence of non-genetic factors on this phenotype.
Keywords:
   • the human genome and the chromosomal basis of heredity
   • Mendelian and non-Mendelian patterns of inheritance and their molecular backgrounds
   • molecular and biological backgrounds of genotype and phenotype
   • genetic variation in individuals and populations: mutations and poly-morphism
   • the molecular and cellular basis of genetic diseases
   • the natural sciences-based identification of genetic disorders and their treatment

7  After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the physiological mechanisms of degeneration, decline, and ageing and their structural and (patho-)physiological consequences.
Keywords:
   • molecular and cellular aspects of ageing
   • physiological aspects of tissue ageing and organ ageing and the organism's functioning
   • pathophysiology of an organism's dying and death
   • epidemiology of age-related diseases and death
   • backgrounds of premature ageing syndromes

### 9.2.3 PATHOPHYSIOLOGY AND PATHOGENESIS

8  After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of reactions to damage or threats to structural or functional integrity, at the level of the molecule, cell, tissue, organ, and organism.
Keywords:
   • physiological adaptations of cells and tissues to environmental circumstances
   • cell and tissue damage and cell death

- acute and chronic inflammation: molecular, cellular, and tissue aspects
- tissue repair, regeneration, and cure
- hypersensitivity and immune-mediated tissue damage
- disturbance of the physiological functions of organs and organ systems
- pathophysiological mechanisms of disorders and diseases at molecular, cell-biological, and tissue level

9  After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the physiological and pathological relations between host and micro-organisms.
Keywords:
- general properties, structure, and physiology of infectious agents
- the body's microbiota
- contagion, infection, and virulence of micro-organisms
- molecular mechanisms in the operation of antibiotics and resistance
- aetiology, pathogenesis, and consequences of common infections
- the body's barriers to infectious agents
- molecular and cellular mechanisms of congenital immune responses
- molecular and cellular mechanisms of humoral and cellular immune responses
- backgrounds of congenital and acquired immune deficiencies
- auto-immunity and hypersensitivity
- vaccination and its principles

10  After completing their Master's programme in Medicine, medical graduates know the most common environment- and food-related diseases and their pathogenesis.
Keywords:
- the effects of stimulants and lifestyle habits
- food safety and nutritional deficiencies
- food and health
- anorexia and obesity
- harmful environmental influences
- poisonings

11 After completing their Master's programme in Medicine, medical graduates know and understand the main aspects of the aetiology, pathogenesis, and pathophysiology of neoplasia at the level of the cell, tissue, organ, and patient, and their systemic effects.

Keywords:

- neoplastic transformation and progression at molecular and cellular level
- characteristics of benign and malignant tumours
- invasion and metastasis
- the immune system's anti-tumour efficacy
- definitions, nomenclature, staging, and grading of tumours
- systemic effects of tumours
- heredity and tumours
- tumour markers

### 9.2.4  SUPPORTING RESEARCH AND THERAPY

12 After completing their Master's programme in Medicine, medical graduates have gained understanding and limited experience of how to perform and interpret the results of commonly used research methods and measuring methods, relating to the structure and function of molecules, cells, tissues, organs, and organisms.

Keywords:

- molecular-biological, biochemical, cell-biological, and histological techniques used in medical-biological research
- use of laboratory animals in medical-biological research
- genetic screening and diagnostics
- biochemical, clinical-chemical, and pharmacological analysing techniques
- immunological and microbiological analysing techniques
- diagnostic-pathological analysing techniques (such as biopsies and post-mortems)
- physical analysing techniques (such as heart and lung testing methodology, ultrasound scans, and X-rays)

13 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of how therapeutic performance is founded on the natural sciences.

Keywords:
- molecular mechanisms of drug efficacy on cells, tissues, organs, and organ systems and their side-effects
- principles of pharmacodynamics and pharmacokinetics
- surgical interventions and techniques
- physical therapy
- radiotherapy

## 9.3 Aspects of the behavioural and social sciences

### 9.3.1 THE MEDICAL PROCESS

1 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of theoretical backgrounds of doctor-patient communication.

Keywords:
- essential characteristics of communication (encoding, sending, receiving, and decoding information)
- oral, written, and digital communication
- medical communication to wider audiences
- the effects of differences in cultural background, gender, socio-economic status, age, and psychological state
- the distinction between physicians' professional performance and their personal views
- significance of communication for the medical process

2 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of psychological and sociological models of illness and health.

Keywords:
- basic characteristics of the bio-psycho-social model
- disease perception, disease behaviour, patient roles, and secondary disease benefits
- the iceberg phenomenon

- social network, group, culture, and stigmatization
- changing roles of the individual (as partner, professional, patient, and victim)
- the interaction between an individual's self-image and his/her disease

3 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of ways of influencing health-promoting behaviour.
Keywords:
- primary, secondary, and tertiary prevention
- methodologies of information and information supply
- the connection between prevention and government policies

4 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the mechanisms that underlie the development and preservation of psychological complaints and disorders.
Keywords:
- aggravating living conditions
- stress and coping mechanisms
- people's vulnerability
- genetic predispositions
- brain disorders
- childhood development
- crucial life-course experiences
- cognition and behaviour
- social support systems

5 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the mechanisms that underlie the development and preservation of unexplained physical complaints.
Keywords:
- anxiety and depression
- psychological and social problems
- attributions and behaviour or avoidance behaviour

- the role of patients' social circle (such as the family, social group, and physician)

6 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the most common kinds of psychotherapy.

Keywords:
- starting-points and underlying model
- methods
- advantages and disadvantages
- range of application and effectiveness

### 9.3.2 The behavioural and social sciences

7 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the normal psychological and social characteristics of human beings.

Keywords:
- human development over the life course (babyhood, infancy, adolescence, adulthood, old age)
- the main behavioural models and personality theories
- different roles of the individual throughout the life course
- the influence of cultural background and gender
- the influence of the family, relatives, the social circle, and work
- normal coping mechanisms

8 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the composition of Dutch society.

Keywords:
- the composition of society
- long-term changes (such as ageing and immigration)
- social class
- influences on health and healthcare

### 9.3.3 Meta-medical sciences

9 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the philosophical context of medical performance.

Keywords:

- the individual as a meaning-conferring subject
- individual perception and action
- autonomy and identity

10 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the general foundations of medical ethics.

Keywords:

- coping with scarcity (prioritizing, rationing, and selection)
- coping with ethical dilemmas, such as abortion and euthanasia
- gene therapy and organ transplantation
- the advisability or non-advisability of implementing ever-increasing technical possibilities

11 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the distinction between scientific and non–scientific knowledge.

Keywords:

- empirical cycle
- underlying constructs and the testability of therapies and alternative therapies

12 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of an outline of the history and the scientific history of medicine.

Keywords:

- the history of biological, psychological, and social definitions of illness and health
- the main historical highlights (such as the mechanistic view of the body, the development of antibiotics, and anaesthesia)
- contemporary views of illness and health in a historical perspective

### 9.3.4 **The organization of healthcare and quality care**

13 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the healthcare set-up in the Netherlands.

Keywords:

- different ways of categorizing healthcare
- the role of physicians, other healthcare professionals, healthcare insurers, authorities, and patient organizations
- the role of governments in matters such as policy, organization, funding, accessibility, availability, and quality
- disability regulations
- the organization of occupational healthcare

14 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of aspects of non-hospital-based care, the healthcare network, and disease management.

Keywords:

- aim and relevance
- organizational aspects of a hospital, home care, regional indication bodies, the GP, voluntary carers
- system weaknesses

15 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the main legal aspects of healthcare.

Keywords:

- regulations affecting physicians (such as the Individual Healthcare Professions Act)
- regulations affecting healthcare institutions (such as the Care Institutions Quality Act)
- regulations affecting doctor-patient relations (such as the Medical Treatment Contracts Act, privacy, duty to inform the patient, and the right to information)
- the role of the Netherlands Healthcare Inspectorate
- the role of the Labour Inspectorate
- the role of the government

- covenants and relations with industry
- medical-ethical aspects of scientific research

16 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of healthcare funding.
   Keywords:
   - supply and demand
   - the role of healthcare suppliers, healthcare clients, health insurers, and the government

17 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of aspects of quality of care.
   Keywords:
   - quality management
   - patient safety
   - safety management systems
   - defence systems
   - system approaches versus person approaches in case of mistakes

18 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of ways in which new understandings can be implemented in practice.
   Keywords:
   - change management
   - dealing with power relations, prejudices, and information backlog
   - Health Technology Assessment

19 After completing their Master's programme in Medicine, medical graduates have acquired knowledge and understanding of the main aspects of guidelines, standards, and protocols.
   Keywords:
   - their uses and limitations
   - their role in different stages of the medical process
   - legal conditions
   - Evidence-Based Medicine, Evidence-Based Practice
   - application in individual cases.

# Apendix

## Motivation

When the Assembly of Deans of Medical Schools considered the advisability of revising the Medical Education Blueprint, which had lastly been amended in 2001, it drew the following conclusions, in line with the Medical Education Commission's advice to that effect.

1 Developments in the field of medical education made it advisable to undertake a revision of the 2001 Blueprint. These developments concerned both the introduction of the Bachelor's-Master's degree structure in first-stage medical education and modernization efforts in second-stage advanced medical education.

2 Developments in the discipline also urged the 2001 Blueprint to be revised, which held out the opportunity to give these developments their proper place in medical education. In the case of medical biotechnology and genetics, the Assembly of Deans of Medical Schools had already advised the Ministry of Health, Welfare and Sport on this matter.

3 In revising the former Blueprint:
a the attainment levels of both the Master's degree programme in Medicine and the Bachelor's degree programme in Medicine needed to be established;
b it needed to be considered whether the CanMEDS model or a similar competency profile, which is currently being tested in the framework of the modernization of advanced medical education, could also be serviceable in drafting the new medical education Framework;
c the document needed to be brought in line with the Dublin descriptors for Bachelor's and Master's programmes in university education.

4 The level of detail of the 2001 Blueprint needed to be reconsidered, aiming to find formulations that were realistic and verifiable and that allowed external accountability of medical education programme content, and paying special attention to the so-called basic sciences.

Acting on these conclusions, the Board decided to establish a Project Group to Revise the 2001 Medical Education Blueprint.

## Task

The Project Group was commissioned to:

- prepare a revision of the 2001 Medical Education Blueprint, taking into account the above considerations;
- enter into regular consultations with the College of Professions and Training Programmes in Healthcare and other relevant parties;
- make sure the document was compatible with international and, particularly, European developments.

## Period

The Project Group was asked produce a final report within 24 months.

## Composition and modus operandi

A core group within the Project Group was charged with preparing the report, consulting with external parties, organizing Project Group meetings, and elaborating the Project Group's conclusions. This core group consisted of the chairperson of the Project Group, the project coordinator, and the secretary; these members of the core group were also members of the Project Group. The Project Group also comprised one member of each university medical centre. The Project Group as a whole was responsible for the final report.

One member of each University Medical Centre was represented on the Project Group. In putting together the Project Group, furthermore, great care was taken to enlist members from different disciplines. Members of the Project Group were appointed as private persons and were to be considered representatives neither of their own institutions nor of their own disciplines. The Project Group also included two student advisors. Furthermore, the Royal Dutch Medical Association, the Ministry of Health, Welfare and Sport, and the University Hospital Patients' Association were also invited to delegate a representative.

The Project Group submitted six-month progress reports to the Medical Education Commission and the Assembly of Deans of Medical Schools. The Project Group was at liberty to seek the advice of external experts if necessary.

## Core Group

| | |
|---|---|
| Professor C. van Herwaarden | chairperson |
| Professor R.F.J.M. Laan | project leader |
| R.R.M. Leunissen, MSc | secretary |

## Project Group

| | |
|---|---|
| Professor J.H. Bolk | member |
| Professor B.G.M. van Engelen | member |
| Professor T.J.M. Helmerhorst | member |
| Professor N.S. Klazinga | member |
| Professor F. Kroese | member |
| Dr. W.M. Mulder | member |
| Professor A.C. Nieuwenhuijzen Kruseman | member |
| Professor E.A.M. Sanders | member |
| H de Vries, PhD | member |
| R.A.F. de Lind van Wijngaarden, PhD | advisory member of the National Interns Platform |
| L. Schöffer, MSc | advisory member of the National Medical Students Platform |
| M.A.G. van den Berg, PhD | advisory member Clients Council of University Teaching Hospitals |
| M. Koning, MSc | advisory member of the Royal Dutch Medical Association (replacing Dr. L. Wigersma until 1-12-2008) |
| A.P.N. van Rooijen, MSc | (replacing Dr. L. Wigersma from 1-12-2008) |
| Mr. L.C.C. de Lange, MSc, LL.M | advisory member of the Ministry of Health, Welfare and Sport (until 1-1-2008) |
| T. Hoogeveen, MSc | (1-1-2008 until 1-7-2008) |
| D.I.M. Hoefnagel, LL.M | (from 1-7-2008) |

## Introduction

In 2008, the Project Group contacted all eight medical faculties in order to compose a survey of the skills lists they used in their medical curricula. The response of these medical faculties showed that, barring minor changes, they were using the skills list that had been included in the Appendices of the 2001 Blueprint. The Project Group, therefore, decided to copy the skills list from the 2001 Blueprint into the Appendices to this revised 2009 Framework.

This skills list has the following structure:
- taking medical history
- physical examination
- skills required for supplementary diagnostics
- therapeutic skills
- communication and reporting skills
- social medicine

In the case of physical examination, skills have been arranged regionally. Skills have mostly been formulated in general terms, with specific examples being given in italics. The term 'examination' implies inspection, auscultation, percussion, and palpitation as appropriate.

Each skill is mentioned only once, including those skills that have specific applications in children, the elderly, men or women, on the assumption that age and sex specification is self-evident. Some skills, such as those involved in taking medical histories, are also mentioned in the physicians' competency profile and could actually have been deleted here. They have been briefly mentioned in this survey for the sake of completeness.

Upon completion of their medical education, students are expected to perform the actions mentioned here in the approved manner. Naturally, they should also be able to interpret the results and findings of the actions concerned, but these skills are mentioned in the physicians' profile and competencies.

## Taking medical history

- taking a medical history
- both systematic and hypothesis-oriented
- somatic, psychological, and social
- medical history presented by patients themselves or by others
- psychiatric medical history
- taking into account aspects of culture and gender

## Physical examination

### GENERAL
- assessment of patients' general condition
  *such as patients' condition in the perspective of their main complaint,*
  *nutritional condition, build, attitude, mobility*
- assessment of vital functions
  *such as body temperature, respiration, pulse rate, blood pressure,*
  *central venous pressure, degree of consciousness (including Glasgow*
  *Coma Scale)*
- assessment of and anthropometric data
  *such as length, weight, circumference of the skull, length of arms and legs*
- assessment of the condition of the skin and mucous membranes
  *such as signs of anaemia, cyanosis, jaundice, and oedema*
- examination of the lymph nodes

### SKIN
- description of skin lesions
  *such as primary and secondary efflorescence, size, distribution, growth*
  *and its shape*

## Head

- **Eye**
  - examination of the eye
    *such as eyelids (including eversion of the upper lid), conjunctivae, sclerae, lachrymal apparatus, position and movements of the eye, pupils, fundoscopy*
  - examination of vision
    *including pupillary reactions, visual fields*
- **Ear**
  - examination of the ear
    *such as inspection of the auricle, the auditory meatus, and the eardrum by way of otoscopy*
  - examination of hearing
    *hearing tests with whispering voice and tuning fork*
- **Nose and paranasal sinuses**
  - examination of the nose and the paranasal sinuses
    *such as inspection of the nose, assessment of nasal obstruction, rhinoscopy*

## Oral cavity and pharynx

- examination of the oral cavity and the pharynx
  *including the tongue, the base of the tongue, the pharyngeal arches, tonsils, salivary glands, and the general condition of the teeth*
- examination of voice and speech

## Neck

- examination of the neck
  *including the trachea, the thyroid gland, lymph nodes, and aa.carotis*

## Thorax

- inspection of its position in rest and movement
- inspection and palpation of the chest wall
  *including gynaecomastia*
- auscultation and percussion of heart and lungs
- examination of lung and heart function
  *including respiratory expansion, tactile vocal fremitus, and apex beat*

### Mammae

- examination of the mammae

  *such as inspection and palpation in consideration of inflammation,
  tumours, mastopathy, including examination of the regional lymph nodes*

### Abdomen

- **General**
  - inspection of its shape
  - auscultation

    *such as bowel sounds, bruits*
  - percussion

    *such as the liver, Traube's space, and bladder dullness*
  - palpation

    *such as the abdominal wall, colon, liver, spleen, aorta, abdominal
    masses, abdominal tenderness and rebound tenderness, clapotage,
    fluid thrill, renal tenderness*

- **Groin**
  - examination of lymph nodes
  - examination of abdominal herniae

    *such as inspection and palpation (also during increased abdominal
    pressure) of groin and hernial orifices*
  - palpation of aa. femorales

- **Anal area**
  - inspection of the (peri-)anal area
  - palpation of the (peri-)anal area

    *by means of rectal examination (anus, rectum, prostate gland, pouch of
    Douglas, parametria, sacrum; also inspection of the glove)*

**GENITALIA**

- **Male**
    - inspection and palpation
      *penis and scrotum*
- **Female**
    - inspection of external and internal genitalia
      *vulva, perineum, speculum examination*
    - palpation
      *by means of bimanual examination (vagina, cervix, uterus, and adnexa)*

**SPINAL COLUMN AND PELVIS**

- assessment of posture at rest
    *including kyphosis, lordosis, and scoliosis*
- assessment of general flexibility
    *spinal column, lumbar flexibility index, pelvis, sacro-iliacal joints,*
    *shoulder girdle*
- assessment of percussion for tenderness, palpitation for pain on vertical pressure and palpitation for tenderness, and Lasègue's sign

**EXTREMITIES**

- examination of shape and function of joints
    *including function tests of the major joints, such as the hip, knee*
    *(cruciate ligaments, meniscus), ankle, feet (posture and shape),*
    *shoulder, elbow, wrist, and metacarpal and finger joints*
- examination of the arterial and venous system
    *such as arterial and venous insufficiency*

**NERVOUS SYSTEM**

- examination of cranial nerve function
    *such as pupillary reactions, extra-ocular movements, corneal reflex,*
    *nystagmus, facial symmetry and sensation, movement of the facial*
    *muscles, and tongue*
- examination of motor system function
    *such as inspection of posture, muscle mass, involuntary movements,*
    *active mobility, and muscular strength in individual muscle groups*

- examination of coordination

  *such as inspection of gait, standing on one leg, Romberg's test, point-to-point testing: between index finger and nose, heel on opposite knee, dysdiadochokinesis, and heel-to-toe*

- explorative examination of sensory system function

  *such as assessment of sense of posture and movement, sense of pain, sense of touch, and radicular sensation disorders*

- assessment of the higher cerebral functions

  *such as orientation, perception, intelligence, memory, speech, new learning ability, and concentration*

- assessment of reflexes

  *such as knee tendon reflex, Achilles tendon reflex, biceps tendon reflex, triceps tendon reflex, and plantar response*

- assessment of neck stiffness
- psychiatric examination

  *thought, affect, mood, action, volition*

### PREGNANCY AND CHILDBED

- ante-natal examination (external examination)

  *such as palpation of the a: size of the uterus, external assessment of foetal position and engagement, foetal heart sounds*

- examination of the newborn baby

  *recording Apgar score, checking for congenital or other anatomical and functional abnormalities, assessment of fontanelles, examination of the hip joints, suctioning oral cavity and pharynx; assessment of motor system, symmetry, muscle tone, posture, and reflexes*

- examination of the new mother

  *including assessment of the lochia, palpation of fundal position, inspection of breasts, examination of abdomen, legs, and (if applicable) episiotomy scar, and checking lactation*

## Skills required for supplementary diagnostics

- taking bodily materials and preparing them for examination
    *such as blood (venepuncture and finger puncture) and materials for*
    *culture (throat, anus, vagina, urethra, cervix)*
- recording an ECG
- assessment of results of (and performing if required) elementary lab tests
    *such as erythrocyte sedimentation rate (ESR) and general*
    *haemogramme, kidney and liver tests, glucose, thyroid function test,*
    *and urine sedimentation*

## Therapeutic skills

- bladder catheterization
- injection or parenteral administration
    *subcutaneous, intracutaneous, intramuscular, intravenous (cannulation)*
- administering superficial and deep anaesthesia
    *application, infiltration*
- treatment of wounds, bites, and abscesses
    *including preparation, asepsis, debridement and stitching of wounds*
    *such as cuts, burns, and insect bites*
- applying dressings and bandages
    *such as pressure dressings and slings*
- administering ointments and drops
- removing foreign bodies and splinters
- first aid and resuscitation
    *such as mouth-to-mouth resuscitation, external cardiac compression,*
    *and treatment of haemorrhages*

## Communication and reporting skills

- oral and written expression
- informing, advising, and supervising individuals and groups
- drafting a policy plan
- conducting therapeutic consultations
- oral and written communication with co-workers and other healthcare professionals (referral, consultation, etc.)
- reporting and registration
- processing and applying information (particularly information from scientific literature)

## Social medicine

- prevention (including vaccination policy) and prediction
- recognizing risk behaviours and lifestyles
- performing targeted medicals
- sick leave assessment
- performing examination of the patients' circle
- performing several interventions in the domain of primary, secondary, and tertiary prevention

    *such as vaccinations, periodical medical examinations, socio-medical*
    *support and supervision, accident prevention, and setting up a*
    *programme*